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Agriculture

Animal and
Plant Health
Inspection
Service

Plant Protection
and Quarantine

Emergency
Programs

Cooperating State
Departments of
Agriculture

September 1983

ACTION PLAN

FALSE CODLING MOTH
Cryptophlebia leucotreta (Meyrick)

This PPQ Action Plan or New Pest Response Guideline has not been updated since its publication date. The actions or guidelines recommended may not be appropriate now, new survey tools may be available, and chemical pesticides named may no longer be registered. This documents is posted until updated versions can be drafted and as such are only guidelines that represent the state of knowledge at the time they were written. Please consult PPQ and/or your State Plant Regulatory Official prior to implementing any recommendations listed herein.

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AUTHORIZATION

This Action Plan provides guidelines and actions for the eradication of a false codling moth infestation. This Action Plan supplements information contained in the Plant Protection and Quarantine (PPQ) Treatment, Emergency Programs, and Administrative Procedures Manuals.

It is to be used in conjunction with other manuals when conducting emergency program activities. The information and instructions contained in this Action Plan were developed with and approved by representatives of cooperating States, the U.S. Department of Agriculture's Agricultural Research and Cooperative State Research Services, and affected industry.

All program technology and methodology employed are determined through discussion, consultation, or agreement with the cooperating State officials.

NOTICE

Recommendations in this Action Plan which involve the use of pesticides concern products which are registered or exempted under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended. Precautions on the pesticide label and all instructions in this Action Plan must be carefully followed.

Federal and/or State personnel may not make any warranty or representations, expressed or implied, concerning the use of these products and shall not be responsible for any loss, damage, or injury sustained as a result of the use of any product as specified in this Action Plan.

The use of trade names in this Action Plan does not imply an endorsement of those products or of the manufacturers thereof by Federal-State pest control programs. Equivalent formulations under different trade names are acceptable.

A. S. Hoyd
Deputy Administrator
Plant Protection and Quarantine

9/9/83
Date

H. B. Jackson
Chairman
National Plant Board

9/2/83
Date

I. GENERAL INFORMATION

A. Action Statement

The information contained in this document is intended for use when a false codling moth infestation is known to exist. This Action Plan is to be used for guidance in implementing eradication procedures and in preventing spread to other locations. It provides technical and general information needed to implement any phase of a false codling moth eradication program. Specific program action is to be based on information available at that time.

B. Background Information

The false codling moth is native to Africa. It is recorded from 45 known hosts plus unidentified hosts in 13 additional genera. It is frequently intercepted in fruit from Africa such as citrus, corn, eggplant, pepper, star apple, okra, tomato, and guava. This pest is a threat to the cotton, corn, citrus, and peach industries in particular. It also prefers sorghum, peppers, guava, okra, and oaks. Fruit injury occurs from boring and feeding of the larvae in the fruit.

This moth occurs south of the Sahara Desert and on the islands of Madagascar, the Mauritius, and St. Helena.

Development from egg to adult, in constant optimum temperature of 77° F. (25° C.) and 90 percent relative humidity, takes approximately 29 days. The adult usually becomes sexually mature after 1 or 2 days, and one generation requires approximately 30 days under these conditions.

C. Life Cycle Application

Insect development is temperature dependent. The egg, larval, and adult development is influenced by air temperatures; pupal development depends on surface soil temperatures. In both environments, a minimum temperature exists below which no measurable development takes place. For false codling moth, this threshold is 53.5° F. (11.9° C.) for the egg, 52.9° F. (11.6° C.) for the larva, and 53.5° F. (11.9° C.) for the pupa, all in air. A temperature model that is designed to use modified air temperature data for all life stages can be used to predict the entire life cycle. The number of degrees accumulated above the developmental threshold for a life stage are referred to as day degrees. For the model depicted in the table below, 768.2° F. (409° C.) day degrees must be accumulated before one life cycle has been completed.

Formula:

Minimum Daily		Maximum Daily		Total		Average Daily		Threshold		Day Degrees
Temp ^{o} F.	+	Temp ^{o} F.	=	$\frac{\text{Temp } ^{o} \text{ F.}}{2}$	=	Temp ^{o} F.	-	Temp ^{o} F.	=	Temp ^{o} F.

Example: (Air model using a 53^{o} F. (11.7^{o} C.) threshold limit.)

Minimum Daily		Maximum Daily		Total		Average Daily		Threshold		Day Degrees
59^{o} F.	+	64.4^{o} F.	=	$\frac{123.4^{o} \text{ F.}}{2}$	=	61.7^{o} F.	-	53^{o} F.	=	8.7^{o} F.

Program actions are guided in part by the insect life cycle data. Duration and timing of eradication treatments, length and frequency of trapping activities, and regulatory functions are affected primarily by the length of time it takes to complete each stage of the life cycle. Temperature data are available from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, private, State, university, or industry sources, or can be generated by strategically placing thermometers on the soil surface.

II. SURVEY PROCEDURES

A. Delimiting Survey

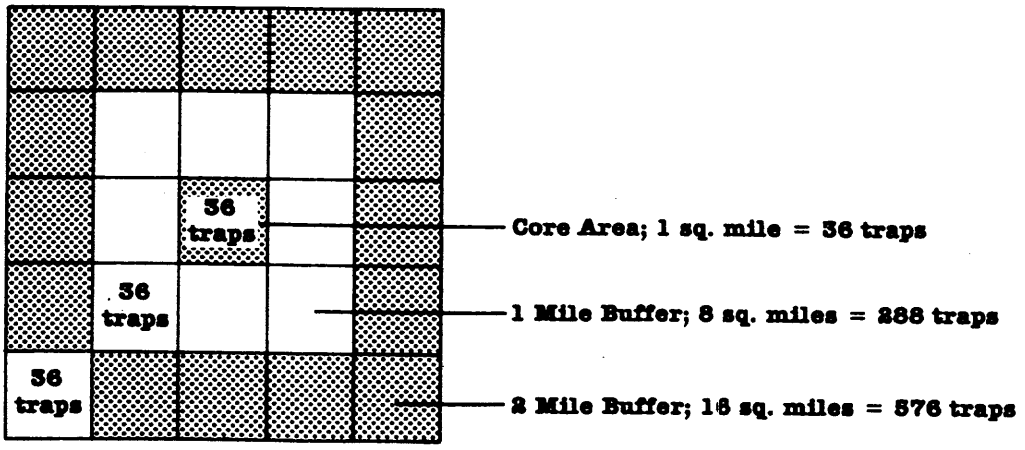
When one or more false codling moths are collected in an area, a delimiting survey will be implemented immediately to determine the population distribution. Using the site of the detection as the focal point (epicenter), 36 sticky wing traps (i.e., Albany International's Scentry trap) will be set out in a core area of 1 square mile (2.6 sq km) in a standard grid array. The traps are baited with E 8/Z 8 and serviced every 2 weeks. Place traps in or near hosts. Traps will be maintained through three false codling moth generations.

1. If only one insect is detected, the delimiting survey is limited to the 1-square-mile (2.6-sq-km) core area.

2. If two or more detections are made within a 1-square-mile (2.6-sq-km) area, the delimiting survey will be conducted over 9 square miles (23 sq km). Traps will be deployed as in the core areas.

3. If six or more detections are made in an area involving 6 square miles (16 sq km) or more, the delimiting survey will be conducted over a 25-square-mile (65-sq-km) area. Traps will be deployed as in the core areas.

Traps Set Per Square Mile



As an optional supplement, light traps may be used near each detection and at selected locations in the core and buffer areas where large numbers of hosts are found.

B. Monitoring/ Evaluation Survey

A monitoring/evaluation survey will be conducted in that area where eradication treatments are applied. The traps, baited with the pheromone, are used at the delimiting rate.

Host examination, soil screening, host collection/holding, visual egg survey, and/or light traps may also be used to supplement monitoring evaluation survey.

C. Host Examination

Host fruits, nuts, berries, heads of grain, and seeds from the core and buffer areas can be surveyed, depending on availability. Hosts from the core area are normally examined at the site.

D. Host Collection and Holding

Selected hosts (fruits, nuts, berries, heads of grain, and seeds) will be collected within 216 yards (200 meters) of a larval or egg find and held for at least one false codling moth life cycle at temperatures and humidity that will provide insect development for identification.

The facility where the hosts are held must be secure to prevent any inadvertent release of moths. Security measures must be equal to those established for a quarantine insect-rearing facility.

E. Soil Sampling

Examination of soil may also be used for the detection of pupae. Soil samples may also be collected within 216 yards (200 meters) of a larval or egg detection. Any recovered pupae will be held at temperatures and humidity that will provide for insect development for identification (see Addendum D).

F. Visual Egg/ Larvae Survey

In the process of host examination, the surface of the fruits, nuts, berries, heads of grain, seeds, twigs, stems, and leaves of the host plants will be examined for eggs and larvae. Any specimens will be collected and held for at least one false codling moth life cycle as given under D above, "Host Collection and Holding."

G.	Detection Survey	The area beyond the last buffer zone will be trapped at a minimum rate of nine traps per square mile for two life cycles where hosts are available up to 10 miles from the epicenter.
H.	Orientation of Survey Personnel	New personnel will be trained, on the job, by experienced personnel. It will be necessary to have 3 working days to teach the many facets of the false codling moth survey.
I.	Survey Records	Records noting the surveyed areas, sites trapped, dates, locations, and hosts in which detections were made will be maintained (see Addendum G).

III. REGULATORY PROCEDURES

A. Instructions to Officers

Regulatory actions will be required until the pest is eradicated. Officers must follow instructions for regulatory treatments or other procedures when authorizing the movement of regulated articles. Understanding the instructions and procedures will serve as a basis for explaining such procedures to persons interested in moving articles affected by the quarantine and regulations. Only authorized treatment procedures may be used.

General instructions that are to be followed in regulatory treatments are found in the PPQ Treatment Manual.

Officers may aid shippers in selecting the authorized treatment or procedure that is most practical for the shippers. They should advise the shipper to apply selected treatments to small quantities of material prior to treating larger quantities to determine the reaction or effects of the treatment procedure. When treating commodities, which are particularly sensitive to the treatments selected, treat more of the commodity than is needed to allow for possible losses.

B. Regulated Articles

1. Any aboveground part of the following:

Common Name	Scientific Name
Apricot	*Prunus armeniaca*
Avocado	*Persea americana*
Banana	*Musa paradisiaca* var. *sapientum* = (*Musa x paradisiaca*
Banana, dwarf	*Musa nana*
Butterseed	*Butryospermum parkii*
Castor bean	*Ricinus communis*
Cherimoya	*Annona cherimola*
Cherries (All)	*Prunus* spp.
Citrus	*Citrus* spp.
Coffee (All)	*Coffea* spp.
Corn	*Zea mays*
Cotton	*Gossypium* spp.
Cowpea	*Vigna unguiculata* subsp. *unguiculata*
Custard apple	*Annona reticulata*
Eggplant	*Solanum melongena*
Flowering maple	*Abutilon* spp.
Ground cherry	*Physalis* spp.
Guava	*Psidium* spp.
Hibiscus (All)	*Hibiscus* spp.

Kafir plum	Harpephyllum caffrum
Lima bean	Phaseolus lunatus
Litchi nut	Litchi chinensis
Loquat	Eriobotrya japonica
Mango	Mangifera indica
Oak (All)	Quercus spp.
Okra	Abelmaschus esculentus
Olives	Olea europaea
Peach	Prunus persica
Pepper (All)	Capsicum spp.
Plum (All)	Prunus spp.
Pomegranate	Punica granatum
Pond apple	Annona glabra
Prune	Prunus domestica
Rose apple	Syzygium jambos
Sorghum	Sorghum vulgare
Soursop	Annona muricata
Spanish bayonet	Yucca alofolia
Spanish dagger (All)	Yucca spp.
Sugar apple	Annona squamosa
Sweetsop	Annona spp.
Star apple	Chrysophyllum cainito
Tomato	Lycopersicon esculentum
Tree tomato	Cyphomandra betacea
Walnut (All)	Juglans spp.
Yucca	Yucca spp.

2. Soil

3. Any other products, articles, or means of conveyance, of any character whatsoever, when it is determined by an inspector that they present a hazard of spread of false codling moth and the person in possession thereof has been so notified.

C. Quarantine Actions

When detections are made, the following steps should be implemented in sequence:

1. With the detection site considered the epicenter, all growers and establishments that grow, handle, move, or process regulated articles within a minimum of 1 1/2 miles (2.4 km) will be issued emergency action notifications requiring treatment or other approved handling procedures. Emergency Action Notifications (PPQ Form 523) and/or comparable State notifications are issued by field personnel to the property owners or managers of all establishments that grow, handle, move, or process articles capable of spreading the false codling moth. A notification will be issued pending positive identification and/or further instruction from the Deputy Administrator.

2. If necessary, the Deputy Administrator will issue a letter directing PPQ field offices to initiate specific emergency action under the Federal Plant Pest Act (7 U.S.C. 150 dd) until emergency regulations can be published in the Federal Register.

The Federal Plant Pest Act of 1957 provides for authority for emergency quarantine action. This provision is for interstate regulatory action only; intrastate regulatory action is provided under State authority. However, if the Secretary of Agriculture determines that an extraordinary emergency exists and that the measures taken by the State are inadequate, USDA can take intrastate regulatory action provided that the Governor of the State has been consulted and a notice has been published in the Federal Register.

The Organic Act of 1944, as amended, provides the Federal Government, either independently or in cooperation with States or political subdivisions thereof, farmers' associations and similar organizations, and individuals, the authority to carry out operations or measures to detect, eradicate, suppress, control, or to prevent or retard the spread of plant pests. This Act does not provide for trespassing on private property, but relies upon State authority and willingness to use State right-of-entry authority.

All program technology and methodology employed are determined through discussion, consultation, or agreement with the cooperating State officials.

3. The Deputy Administrator, through the National Regional Directors, will notify State cooperators of the false codling moth detection, actions taken, and actions contemplated.

A description of the regulated area with support documents will be developed by USDA and cooperators and provided to the Regulatory Services Staff, National Program Planning Staff (NPPS).

4. APHIS Regulatory Coordination Staff will publish in the Federal Register emergency regulations under the Federal Plant Pest Act.

5. After a reasonable time, taking into consideration such factors as the biology of the pest, climatic conditions, and infestation spread, a proposal to promulgate a quarantine under the Plant Quarantine Act will be published. The proposal will announce a date for submitting written comments, which shall be approximately 60 days after publication.

6. After receipt of written comments, a final determination specifying the action decided upon will be published in the Federal Register. A quarantine under the Plant Quarantine Act will be enacted if eradication has not been achieved.

D. Regulatory Trapping

Trapping within the regulated area will be conducted around all establishments where regulated articles are grown, handled, moved, or processed. Establishments that might be involved are: Airports, landfill sites, fruit stands, farmers' markets, produce markets, nurseries, flea markets, and any other establishments that handle regulated articles. A minimum of two sticky wing traps per establishment will be used.

E. Use of Authorized Chemicals

The PPQ Treatment Manual and this Action Plan contain the authorized chemicals, methods, and rates of application, and any special application instructions. Concurrence by the Emergency Programs staff is necessary for the use of any chemical or procedure for regulatory purposes.

F. Approved Regulatory Treatments

1. Soil Treatment. An approved insecticide (Diazinon®) applied to the soil of nursery stock and/or within the drip line of host plants. All fruit to be removed and all host plants held for one life cycle after treatment before certification.

2. Fumigation. The application of an approved fumigant as a treatment (methyl bromide, ethylene dibromide) alone or in conjunction with cold treatment procedures.

3. Cold Treatment. The use of cold temperatures as a treatment on selected products alone or in conjunction with fumigation procedures.

4. Sanitation. The regular removal and destruction of rotting or fallen fruit, acorns, heads of grain, nuts, or berries from premises, establishments, and vehicles handling regulated articles.

3. Principal Activities

The following identifies principal activities necessary for conducting a regulatory program to prevent the spread of false codling moth. The extent of regulatory activity required is dependent on the degree of infestation. For example, safeguarding fruit stands throughout the entire regulated area which are engaged in only local retail activity may not be necessary when the regulations that are imposed are based on a limited and light infestation. On the other hand, mandatory

checks of passenger baggage at airports and the judicious use of road patrols and roadblocks may be necessary where general or heavy infestations occur.

1. Advising regulated industry of required treatment procedures.

2. Supervising, monitoring, and certifying commodity treatments of commercial lots of fruits, vegetables, grains, and nuts.

3. Contact visit with:

   a. Security and airline personnel.
   b. Fruit stands.
   c. Local growers and packers.
   d. Farmers', produce, and flea markets.
   e. Commercial haulers of regulated articles.
   f. Public transportation.

4. Visiting canneries, graineries, and other processing establishments.

5. Monitoring the movement of waste material to and from landfills to ensure adequate disposal of regulated article refuse.

6. Monitoring the movement of regulated articles through major airports and other transportation centers.

7. Movement of host materials along major highways and across quarantine boundaries.

H. Orientation of Regulatory Personnel

Only trained or experienced personnel will be used initially. Replacement personnel will be trained by the individual being replaced. A training period of 3 working days is necessary for the orderly transfer of these functions.

I. Regulatory Records

Records will be maintained, as necessary, to carry out an effective, efficient, and responsible regulatory program (see Addendum G).

IV. ERADICATION PROCEDURES

Emergency Programs staff, in consultation with methods and research agencies, outlines treatments to be used. Emergency Programs staff must be notified of all treatment plans. If treatments selected or proposed are not in conformance with current pesticide labels, an emergency exemption can be provided under Section 18 of the FIFRA, as amended. For further instructions, see Emergency Programs Manual, Section V, B.

Eradication of a false codling moth infestation is essential. Local conditions will determine the most acceptable procedure to achieve eradication.

A. Recommended Pesticides

1. Azinphos-Methyl (Guthion®)
2. Diazinon®
3. Fenvalerate
4. Permethrin

B. Approved Eradication Treatments

1. Aerial Spray

Aerial application of insecticide should be initiated immediately. Aerial sprays will be applied at the prescribed intervals over a period equal to two life cycles. The number of applications will vary depending on the day degree accumulations in the infested area. The area to be sprayed will extend a minimum of 1 1/2 miles (2.4 km) beyond any known infestation. After an estimated two generations of negative trapping, spray operations may be discontinued. Weather conditions may dictate changes in spray schedule.

2. Ground Spray

Ground application of insecticide will be initiated immediately. All host plants which provide for reproduction of the false codling moth on the infested property, adjacent property, and within 216 yards (200 meters) of the known infestation will be sprayed at the prescribed intervals. On properties which cannot be aerially sprayed or where inclement weather precludes the use of aerial treatments, ground treatments may be used to maintain a viable insecticide application at the detection location and within 216 yards (200 meters) surrounding it. Ground spraying may be discontinued after an estimated two generations of negative trapping or after the initiation of aerial treatment.

The decision to apply insecticide applications will be based on the best weather information available. In the event rain washes an application from the foliage, plans will be implemented to retreat the area.

Retreatment should not be considered if weather reports indicate a 50-percent or greater chance of precipitation in the 48-hour period following washoff.

The objective is to maintain a viable spray in the eradication zone and prevent environmental contamination. Any treatment or retreatment recommendations will be considered based on data from the environmental monitoring effort.

3. Supplemental Methods

a. Fruit Stripping: Properties with larvae in the fruit will be handled as in 1 or 2 above. In addition, all preferred host fruit within 216 yards (200 meters) of the larval site may be stripped if practicable.

b. Soil Treatment: Properties with confirmed larval, pupal, and/or egg infestations and the environs within 216 yards (200 meters) surrounding it will have approved soil treatments applied within the drip line of all host plants. Treatment will be applied at the prescribed intervals.

c. Sanitation: Sanitation in orchards, nurseries, farms, gardens, and other establishments where hosts are present will be carried out when practical within the core and buffer areas.

d. Host Destruction: In situations with very limited area of infestation, consideration will be given to the destruction of host fruits or crops (cotton, corn, field crops) by disking or plowing. In cases of such destruction, all host material must be left completely buried by the disking or plowing process.

C. Eradication/ Control Method Selection

The following parameters or criteria will determine the minimum treatments to be used in achieving eradication. Expanded or additional treatment actions can be applied if mutually agreed upon by cooperating agencies.

Eradication measures will continue for at least two generations and trapping will continue for at least three generations following the last detection.

1. If one adult male or one unmated adult female is detected in an urban/residential or commercial area, no eradication treatments will be initiated.

2. When a single mated female, a larva, a pupa, or multiple males/unmated females are detected involving less than 6 square miles (16 sq km), sanitation, soil drench, and ground applied foliar sprays will be employed. Similar moth detections in a commercial area will require treatment by sanitation, soil drench, and ground or aerial sprays, as applicable.

3. When more than six detections of any moth stage(s) are detected in an area greater than 6 square miles (16 sq km), soil drench and ground and aerial applications will be employed and include and extend 1 1/2 miles (2.4 km) beyond the known infestation.

D. Orientation of Eradication/Control Personnel

Only trained and experienced personnel will be utilized initially. Replacement personnel will be trained by the individual being replaced. A period of 3 working days is necessary for the orderly transfer of these functions.

E. Eradication/Control Records

Records noting the location of detection, dates, number and type of treatments, and materials and formulations used will be maintained for all areas treated (see Addendum G).

F. Monitoring

An effective monitoring program will be implemented to aid in the evaluation of program efforts and environmental impact. The application and use of insecticides and other controlled substances will be assessed through the use of appropriate monitoring program criteria. The evaluation must effectively address Agency, cooperator, and public concerns.

The monitoring program will include at least the following elements:

1. Evaluating dye cards to monitor aerial application.

    a. Droplet size information.
    b. Droplet distribution information.
    c. Identification of wind drift components.
    d. Verification of spray block boundaries.
    e. Identification of skips.

2. Sampling to evaluate effect on environmental components.

   a. Water sampling to detect insecticide levels through direct application, leaching, and runoff.
   b. Soil sampling to determine insecticide levels and residues.
   c. Foliage sampling to identify residues.
   d. Biological organism sampling to determine impact of insecticides.
   e. Air sampling to determine presence of pesticides in respirable air.

The monitoring program is to be a combined effort between the State in which the emergency program is being conducted and PPQ. If specific plans need to be developed for monitoring activities, the Emergency Programs staff will request assistance and guidelines from NPPS.

V. CONTACTS

When a false codling moth eradication program has been implemented, its success will depend upon the voluntary cooperation, assistance, and understanding from other involved groups. The following is a list of groups which either are involved in or must be kept informed of all operational phases of an emergency program.

A. Other Federal, State, county, and municipal agricultural officials

B. Grower groups

C. Universities

D. Foreign agricultural interests

E. National, State, and local news media

F. State and local law enforcement officials

G. General public

H. Public health

VI. ADDENDA

Addendum A--Definitions

Aerial Treatment:	Applying spray by aircraft over a treatment area.
Array:	The trapping pattern in a 1-square-mile (2.6-sq-km) area.
Buffer Area:	The area extending beyond the boundary of the core--1-mile and 2-mile buffer.
Cold Treatment:	The use of cold temperatures as a treatment on selected products alone or in conjunction with fumigation procedures.
Commercial Production Area:	An area where host material for commerce is grown.
Confirmed Detection:	A positive laboratory identification of a submitted life form (specimen) as false codling moth.
Core Area:	This area involves a minimum of 1/2 mile (0.8 km) beyond any confirmed false codling moth detection.
Cryptophlebia leucotreta (Meyrick):	The scientific name of the false codling moth.
Day Degrees:	The accumulation of heat units above a specified developmental temperature threshold during a life stage.
Delimiting Survey:	A survey conducted to determine the extent of the infestation in an area where false codling moth has been detected.
Detection:	The collection of any life stage of false codling moth.
Detection Survey:	A survey conducted in a susceptible area not known to be infested with false codling moth.
E 8/Z 8:	The chemical designation for the sex pheromone for false codling moth.
Epicenter/Focal Point:	The initial site of an infestation.
Fumigation:	The application of an approved fumigant as a treatment (methyl bromide and ethylene dibromide) alone or in conjunction with cold treatment procedures.

Generation: (Life Cycle)	The period of time for the pest to complete all stages of development predicated on day degrees or on the basis of other biological information.
Ground Spray:	Using ground spray equipment to apply an insecticide to host vegetation in a false codling moth infested area.
Host:	A plant species that provides for the potential reproduction of the false codling moth.
Host Collection/ Holding Survey:	A survey conducted in the core and buffer areas of a false codling moth detection by the collection of host material. The host material is held to determine the extent and nature of an infestation.
Host Examination Survey:	A survey conducted by examining hosts for eggs and larvae.
Infestation:	The collection of two or more false codling moths, a pupa, a larva, or mated female from an area or the detection of a single adult determined to be associated with a current infestation.
Infested Area:	The area so declared by program officials where criteria for "infestation" have been met.
Monitoring/Evaluation Survey:	A survey, using traps, with or without a host collection/holding/egg survey, conducted in an area where an insecticide treatment has been applied and the effectiveness of the treatment is being evaluated.
PPQ-APHIS-USDA:	Plant Protection and Quarantine, Animal and Plant Health Inspection Service, United States Department of Agriculture.
Regulated Area:	An area that extends at least 1 1/2 linear miles (2.4 km) in any direction from an infested property.
Regulatory Trapping:	Trapping conducted around establishments where regulated articles are grown, handled, processed, or moved.
Soil Treatment:	The application of an approved insecticide to the soil of nursery stock and within the drip line of host plants.
Sticky Wing Trap:	A disposable, sticker coated trap used primarily for lepidopterous insects.
Urban/Residential Area:	Noncommercial crop production area generally containing multiple or single family dwellings.

Addendum B--Safety

1. GENERAL INFORMATION

Personnel and public safety must be prime considerations at all times. Safety practices should be stressed in preprogram planning. Supervisors must enforce on-the-job safety procedures.

Pesticides authorized for use vary in toxicity. When used in accordance with label instructions, materials do not constitute a threat to people, wildlife, bees, etc. Specific safety precautions of each pesticide are listed on the label. In addition, any special precautions listed in this or specific manuals shall be observed.

Keep pesticides in closed, properly labeled containers in a dry place. Store them where they will not contaminate food or feed and where children and animals cannot reach them.

When handling a pesticide, follow all precautionary labeling.

Should there be contact through spillage or otherwise, wash immediately with soap and water. Should clothing become contaminated, launder before wearing again. Refer to PPQ Treatment Manual, Section X, for additional information.

Empty pesticide containers should be disposed of in an approved sanitary landfill, by incinerator, or by other satisfactory methods approved by the Federal Environmental Protection Agency whereby they will not present a hazard or problem. Arrangements for disposal of such containers should be completed and thoroughly understood by all parties directly involved with a program prior to the actual start of operations. PPQ Regional Offices and the National Program Planning Staff should be consulted for pertinent information in States where operations are conducted.

When applying a pesticide, consider the potential impact of the pesticide on all components of the total environment, including humans, crops, livestock, wildlife, aquatic life, nontarget insect species, and domesticated honey bees. Avoid contamination of lakes, streams, ponds, or watersheds.

2. FIRST AID SUGGESTIONS

In case of accidental poisoning or as soon as any person shows symptoms of having been affected by any pesticide:

a. Remove the person to a place where there will be no further contact with the pesticide.

b. Have the person lie down and keep quiet.

c. Call a physician and provide the name and formulation of the pesticide in use and first aid given.

d. Keep the local Poison Control Center telephone number posted where pesticides are stored and used. The number may also be found on the inside front cover of the telephone directory. Call Chemtrex on toll free Area Code (800) 424-9300 for additional assistance in the event of spills, leaks, fires, exposures, accidents, or other chemical emergencies.

3. MANAGING/MONITORING PESTICIDE SPILLS

Supervisors involved in pesticide application must have available and be familiar with "Guidelines for Managing and Monitoring Pesticide Spills" dated March 1981. In addition, the following pesticide spill safety and cleanup equipment must be present at all job sites where pesticides are stored or used.

a. Safety Equipment

(1) First Aid Kit--Bus and truck kit, GSA 66545-00-664-5312 (or equivalent)
(2) Fire Extinguisher--5 lb. size for class A, B, C fires
(3) Portable Eye Wash Kit

b. Cleanup Equipment

(1) Shovel, square-point, "D" handle
(2) Large heavy duty plastic bags with ties (25)
(3) Rubber boots (2 pairs)
(4) Disposable coveralls (4 pairs)
(5) 5 gallons of water
(6) Rubber gloves (4 pairs)
(7) Respirators and pesticide cartridges (2 sets)
(8) Broom
(9) Dust pan
(10) Liquid detergent (1 pint bottle)/paper towels
(11) Scrub brushes (2)
(12) Plastic cover or tarpaulin to cover dry spills (10' x 12')
(13) Absorbent material to absorb liquid spills (sand, sawdust, vermiculite, "Kitty Litter," etc.)
(14) 55-gallon drum for pesticide disposal (optional)

Addendum C--Hosts

The false codling moth host list is separated into preferred and other recorded hosts.

The hosts are listed by common and scientific names. The common names are arranged in a manner that is indicative of their usage. The common names of a particular group or family of hosts are listed first. In all instances, an attempt has been made to use the most widely recognized common name. Those species without an accepted or approved common name are given at the end of the appropriate list.

PREFERRED

Common Name	Scientific Name
Corn	*Zea mays*
Cotton (All)	*Gossypium* spp.
Guava, Common	*Psidium guajava*
Mandarin orange	*Citrus reticulata*
Oak (All)	*Quercus* spp.
Okra	*Abelmaschus esculentus*
Oranges	*Citrus* spp.
Peach	*Prunus persica*
Pepper (All)	*Capsicum* spp.
Sorghum	*Sorghum vulgare*
Tangelo	*Citrus paradisi* x *Citrus reticulata*
Temple orange	*Citrus reticulata* x *Citrus sinensis*

OTHER

The literature indicates these hosts could allow for false codling moth development, but does not disclose all the conditions under which the host/pest relationship occurs.

Common Name	Scientific Name
Apricot	*Prunus armeniaca*
Avocado	*Persea americana*
Banana	*Musa paradisiaca* var. *sapientum*
Butterseed	*Butryospermum parkii*
Castor bean	*Ricinus communis*
Cherimoya	*Annona cherimola*
Cherries (All)	*Prunus* spp.
Coffee	*Coffea* spp.
Cowpea	*Vigna unguiculata*
Custard apple	*Annona reticulata*
Eggplant	*Solanum melongena*

Elephant grass	*Pennisetum purpureum*
Flowering maple	*Abutilon* spp.
Grapefruit	*Citrus paradisi*
Ground cherry	*Physalis* spp.
Hibiscus	*Hibiscus* spp.
Hottentot kafir bean tree	*Schotia speciosa*
Husk tomato	*Physalis ixocarpa*
Jute	*Sida* spp.
Kafir marvolanut	*Sclerocarya caffra*
Kafir plum	*Harpephyllym cattrum*
Kapok ceiba	*Ceiba pentandra*
Lemon	*Citrus limon*
Lima bean	*Phaseolus lunatus*
Lime	*Citrus aurantiifolia*
Litchi, Litchee	*Litchi chinensis*
Loquat	*Eriobotrya japonica*
Mango	*Mangifera indica*
Miraculous berry	*Synsepalum dulciticum*
Olives	*Olea europaea*
Persimmon	*Diospyros* spp.
Plum	*Prunus* spp.
Pomegranate	*Punica granatum*
Pond apple	*Annona glabra*
Prune	*Prunus domestica*
Rose apple	*Syzygium jambos*
Sidas	*Sida* spp.
Soursop	*Annona muricata*
Spanish bayonet	*Yucca alofolia*
Spanish dagger	*Yucca gloriosa*
Star apple	*Chrysophyllum cainito*
Sugar apple	*Annona squamosa*
Sweetsop	*Annona squamosa*
Tomato	*Lycopersicon esculentum*
Tree tomato	*Cyphomandra betacea*
Walnut (All)	*Juglans* spp.
Yucca	*Yucca* spp.

No Common Name Available

Chrysophyllum magalis-montanum
Combretum apiculatum
Combretum zeyheri
Podocarpus falcata
Pseudolachnostylis maprounaefolia
Royena pallens
Triumfetta spp.
Vangueria infausta
Ximenia caffra
Zizyphus mucronata

Addendum D--Life History

1. SYSTEMATIC POSITION

False codling moth, Cryptophlebia leucotreta (Meyrick)--(Lepidoptera)
(Tortricidae, Olethreutinae)

Class:	Insecta
Order:	Lepidoptera
Family:	Tortricidae
Subfamily:	Olethreutinae

The genus has more than 25 species, the majority in the Indo-Pacific area. Only a few species are of economic importance. Related economic species are:

Koa seedworm, C. illepida (Butler)
Litchi fruit moth, C. ombrodelta (Lower)

2. IDENTIFICATION CHARACTERS

Adults: About 6 to 9 mm in length, forewings also 6 to 9 mm. Overall, predominately dark brown to gray. Forewings elongate and triangular with prominent dorsal scales near the base and beyond middle light brown to white and a semioval dark-reddish patch mixed with black with a white center. The forewings are fringed with hairs. Hindwings generally lighter grayish brown, darker towards outer margins. The thorax has a double posterior crest. The male has a larger pale-grayish genital tuft, a dense brush of grayish-white hairs on the hind legs, and a deep semicircular pocket in the hindwings.

Eggs: About 1 mm long, translucent white, flat and oval shaped with flange around it.

Larvae: First instar, very small (1 to 1.3 mm in length) recognizably a caterpillar with a creamy-white (yellowish-white) body and brownish-black head, body marked with minute black spots each with a short hair.

With age, subsequent instars take on a characteristic pinkish-red color which is less intense on the underside.

The fifth (final) instar is 12 to 20 mm in length with the diffuse overall pinkish color tending to orange yellow on the sides, top, and legs. The head is a light maroon and the pronotum a yellowish brown. The pronotum juts out in front on

the sides and to the rear. It has an anal comb of 2 to 7 teeth.

Pupae: About 7 mm in length, yellow to dark brown, with a transverse row of spines on each segment. Male pupae are smaller and have two small knobs side by side in the center of the ventral side of the ninth abdominal segment. Female pupae are larger and lack the knobs. A silk cocoon is spun by the larva, which is normally decorated by soil and leaf fragments to make it obscure on the soil surface.

3. BIOLOGY

A mated female moth flies at night, lands, and deposits eggs between 5 and 11 p.m. Eggs are usually laid singly and at random in depressions of the rind of host fruit or on the smooth shell of an acorn, but may at times be bunched together. Sometimes eggs are laid on the foliage. The female may lay three to eight eggs per fruit (nut, pod, seed, grain head, and berries) and total as many as 800 (average 456) over her lifespan, at optimum temperatures (77° F. or 25° C.). Since the moth may not wander far, it may also lay eggs on fallen fruit (nuts, seeds, grain heads, and berries). If there are numerous females, large numbers of eggs may accumulate on the fruit (nuts, seeds, grain heads, and berries) only a few will survive due to lack of food and cannibalism. If the host is peach, egg laying occurs only on nearby leaves (90 percent) or on twigs (10 percent), but not on the fruit. The eggs are almost always on the upper surface of peach leaves. Overlapping of generations occurs since there can be five to six generations a year in warm areas and two to three under unfavorable conditions in cooler areas. Eggs are laid at irregular intervals over a long period. This results, later in the year, in an apparent continuous production of eggs. The incubation period is 4 days under optimum conditions and 22 days at minimum developmental conditions.

When the larvae hatch, they may wander about for a little while and then gnaw through the rind, making burrows about 1 mm in diameter. The entrance is conspicuous due to the presence of frass and discoloration of the surrounding rind. When the host has a hard rind, such as an acorn, entrance is made at the base or attachment to the cup where softer tissue exists. When the host has a softer rind, i.e., citrus or peaches, the larvae will burrow into the rind almost anywhere, but there is a preference for the navel end or for an injured area or cut in the rind. In some rind, such as avocado, the entrance may be marked by formation of a raised crater. The first instar larvae bore into and consume the pulp, leaving masses of granular excreta. There are five instars. The younger larvae feed near the surface, but the older larvae bore towards the center. In cotton, the young larvae feed almost entirely inside the boll wall, but older larvae penetrate the inner septum and feed on developing seeds and lint and can complete development on seeds in open bolls. All such feeding damages the boll and provides for entrance of pathogens which, specially under humid conditions, can complete the destruction through decay. Infested fruit (citrus, pome, and stone) colors, ripens early, and can be readily spotted. Only one to three larvae per fruit generally survive in a larval period lasting from 12 to 33 days in warm weather and 35 to 67 days in cooler weather.

Temperature and poor food quality can slow down the rate of larval development. By the time the larva is ready to leave the fruit, the fruit may have dropped. Premature fruit fall caused by this species is reported to be more severe than that caused by the unrelated codling moth. The larva chews open a conspicuous exit hole in the rind and drops to the ground or crawls out of the host to spin a cocoon covered by particles of soil, leaf, or debris. If the surface is too hard, the larvae will migrate short distances to find cover, such as in crevices of the bark of host trees, etc., as high as 10 feet off the ground.

Once the cocoon is spun, the larva becomes an inactive prepupa. This stage may last from 2 to 27 days, depending on temperature, but is usually 4 to 7 days. If newly formed cocoons are covered with sand, the prepupae may leave the cocoons to form a new cocoon at the soil surface. The prepupa molts into a pupa which turns from cream colored and soft to hard and dark brown. The male pupal stage requires a longer period on the average than the female pupal stage. Females require from 11 to 39 days to emerge, depending on temperature, and the entire cocoon stage is 13 to 60 days. Males can require from 13 to 47 days to emerge depending on temperature, and the entire cocoon stage is 14 to 68 days.

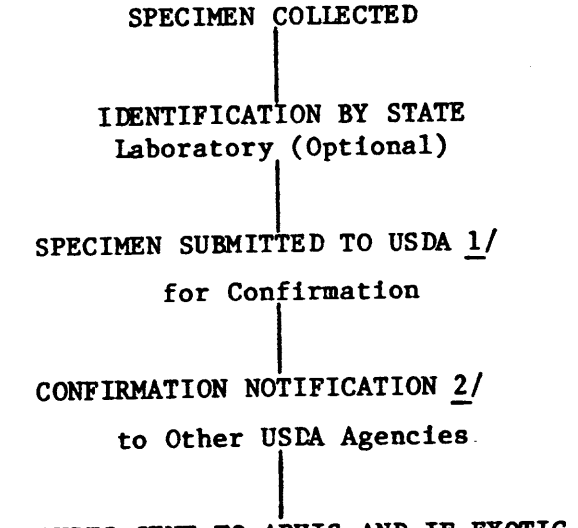
The small inconspicuous moth which emerges flies only at night and generally does not fly far. The male lives for 14 to 57 days. The female usually survives longer--16 to 70 days. Their dispersal normally is limited to several hundred meters. Their numbers are generally controlled by temperature and the availability of host material. The females do have a preoviposition period ranging from half a day to 25 days, but normally it is 1 to 7 days depending on temperature.

The complete life cycle of the false codling moth ranges from 30 days under optimum conditions to 174 days under minimal conditions.

Addendum E--Identification of Moths

As many specimens as possible of the pest are to be collected for identification by the area identifier. Specimens identified by area identifiers as false codling moth and suspect moths should be forwarded dry in a small cardboard box for confirmation to 1/ below. These specimens must be accompanied by PPQ Form 391 marked "Urgent" (see PPQ Manual M390.500).

INFORMATION FLOW FOR THE IDENTIFICATION OF MOTHS



APHIS/ARS 1/ All States 2/ NAPPO 3/

1/ Insect Identification
and Beneficial Insect
Introduction Institute
Agricultural Research Service
U.S. Department of Agriculture
Building 476, BARC-EAST
Beltsville, Maryland 20705

2/ APHIS Plant Protection and Quarantine

3/ All States State and Territory Agricultural Regulatory Officials

Addendum F--Technical Application Data

1. FOLIAR APPLICATIONS WITH GROUND EQUIPMENT

The following pesticides may not be registered for this use on a given crop. Any application must be approved for such crops by the Environmental Protection Agency (EPA).

Azinphos-Methyl (Guthion®)--16 ounces (473 ml) of 22 percent Guthion® in 100 gallons (378.5 L) of water per acre depending on type of equipment used. Apply as a full coverage spray and repeat at 5- to 10-day intervals.

Fenvalerate (Pydrin®)--5 1/3 to 10 2/3 ounces (158 to 315 ml) of 30 percent Pydrin® in 4 to 100 gallons (15 to 379 L) of water per acre, depending on type of equipment and crop/host being sprayed or 0.81 to 1.65 pints (0.384 to 0.781 L) in 10 to 250 gallons (38 to 950 L) of water per hectare. Apply as a full coverage spray and repeat at 5- to 10-day intervals.

Permethrin (Ambush®)--4 to 8 ounces (118 to 236 ml) of 25.6 percent Ambush® in 5 gallons (18.9 L) of water per acre, depending on type of equipment and crop/host being sprayed or 0.62 to 1.24 pints (0.293 to 0.585 L) mix in 12 gallons (47 L) of water per hectare. Apply as spray when detections are made and, thereafter, 5 to 10 days apart.

2. AERIAL APPLICATION

The following pesticides may not be registered for this use on a given crop. Any application must be approved for such crops by the Environmental Protection Agency (EPA).

Azinphos-Methyl (Guthion®)--16 ounces (473 ml) of 22 percent Guthion® in not less than 1 gallon of water per acre or 2.5 pints (1.17 L) in not less than 2.5 gallons (9.5 L) of water per hectare. Apply as a spray when detections are made and, thereafter, approximately 2 weeks apart.

Fenvalerate (Pydrin®)--5 1/3 to 10 2/3 ounces (158 to 315 ml) of 30 percent Pydrin® in 1 to 5 gallons (3.8 to 18.9 L) of water per acre, depending on type of equipment and crop/host being sprayed or 0.81 to 1.65 pints (0.384 to 0.781 L) 2.5 to 12.4 gallons (9.5 to 47 L) of water per hectare. Apply as a spray when detections are made and, thereafter, approximately 5 to 10 days apart.

Permethrin (Ambush®)--4 to 8 ounces (118 to 236 ml) of 25.6 EC Ambush® in 1 gallon (3.8 L) of water per acre, depending on type of equipment and crop/host being sprayed or 0.62 to 1.24 pints (0.293 to 0.585 L) in 2.5 gallons (9.5 L) of water per hectare. Apply as a spray every 5 to 10 days.

3. STICKY WING TRAP LURE

A polyethylene stopper of 10 mm diameter will be installed in the trap. This is easily done by pushing a small thumbtack through the outside of the trap and pushing the stopper onto the tack on the inside. The stopper will have previously been injected by means of a microsyringe with 2 mg of a 5:5:1 solution of E 8 plus Z 8 isomers of 1-dodecene acetoxy plus 1-dodecene acetate. A period of 14 days between servicings and rebaiting is optimum but will depend on existing weather conditions.

4. LIGHT ENHANCEMENT

A Mercury Vapor Light (commercially available from entomological supply companies) may be located next to a pheromone lure and timed for night operation. This will greatly strengthen the total catch at the site. The male moth is attracted at a distance by the pheromone but responds to the light when it gets close.

As this system is labor intensive, it is to be employed only in the core and buffer areas in or near detections or where large numbers of hosts are found.

5. SOIL SIEVING

A minimum 1-meter (39-inch) square area of surface soil may be collected from under host plants. The sample will be inspected, large objects removed, and pupae (in their cocoons) separated from the rest of the debris and placed in a suitable container. The container is fully labeled with date and location before transport.

If there are any problems with the separation of the cocoons from the debris, the soil sample may be placed in a suitable container, properly labeled, and transported to an authorized facility for sieving. The sample is placed in a 1 cm sieve and washed with water until all lumps have broken up and only solid objects remain in the sieve. Examination of these objects should reveal any cocoons among them.

6. SOIL TREATMENT

Diazinon® AG-4--3.54 ounces (104.7 ml) of Diazinon® AG-4 per 20 gallons (77 liters) of water. Apply the number of prescribed treatments at 14- to 16-day intervals as per specific exemption granted by the Environmental Protection Agency to all hosts on properties where larvae, pupae, and/or eggs have been found and environs within 216 yards (200 meters) of find.

7. SANITATION

All dropped fruit, nuts, heads of grain, seed, and berries are picked by hand or raked from the ground. The collected material is treated in one of the following ways:

a. Immediately placed in a trench and covered with soil to a minimum depth of 1 1/2 feet (46 cm). The soil should be thoroughly compacted.

b. Collected in suitable containers and transported to an approved landfill.

c. Immersed in drums of water and covered with a thin layer of old engine oil for 1 week before disposal.

d. Pulped in a hammermill and then buried or disposed of in an approved landfill.

The above must be carried out on a weekly basis to the end of the fruiting season for each host.

All out-of-season citrus, pome, and stone fruit must be removed. Plantings of neglected, abandoned, fallow or wild hosts must either be cleaned up or destroyed. Soil may be disked or otherwise raked for the destruction of any pupae that may be present.

Addendum G--Forms

To be added later.

Addendem H--Contributors

Industry

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The aformentioned individuals were major contributors to the development, preparation, and review of the Action Plan. Other contributors and/or reviewers were research scientists of Agricultural Research Service and regional and staff personnel of Plant Protection and Quarantine.

Addendum I--References

The literature on false codling moth is somewhat extensive. Pertinent articles relevant to this Action Plan are listed here. Also listed are lead documents on sterilization, which may eventually be a viable option.

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